Road safety data and indicators

Prof. Dr. Péter Holló

KTI Institute for Transport Sciences Non-profit Ltd.
Széchenyi István University

Content

Content

1. Some basic considerations

Task of this WP 5 (Evaluation, monitoring):

- to monitor (follow-up) the implementation of the local rs programme
- to evaluate the effects

We do not deal with comparison and ranking of countries or pilot areas.

1. Some basic considerations /2

We would like to monitor the (hopefully positive) changes and to prove the benefits arising from programme implementation.

In order to be able to do this we have to repeat the situational assessment after the implementation of the programme.

(So-called “before-after” comparison).

It is clear that only the numbers of accidents/victims and the exposure data are not enough.

We have to evaluate the efforts taken in order to improve the road safety situation.

Therefore we need rs performance indicators too.

1. Some basic considerations /3

At this moment we have only national performance indicators.

In this project we need local performance indicators.

These can be measured, observed or collected.

The methodology of performance indicators can be found in:

- ETSC publications (www.etsc.eu)
- SafetyNet project. (www.erso.eu)*
- Road Safety Observatory of EU (www.erso.eu)
- PIN project of ETSC (www.etsc.eu)

* theory and practice (manual for data collection)

2. Road safety assessment

what are the realistic indicators to monitor?
what are the realistic indicators to use for evaluation?

The main risk factors:

- alcohol related road crashes
- safety belt and child restrains
- speed
- child injury prevention from road crashes, etc.

3. Road safety performance indicators (SPIs) according to main risk factors

3.1 alcohol related accidents

In the SafetyNet project the following SPIs have been proposed on alcohol and drugs:

1. Number and percentage of severe and fatal Injuries resulting from road accidents involving at least one active road user impaired by psychoactive substance.
2. Percentage of fatalities resulting from accidents involving at least one driver impaired by alcohol.
3. Percentage of fatalities resulting from accidents involving at least one driver impaired by drugs other than alcohol.

(See details on http://erso.swov.nl/data/content/spis_on_alcohol_and_drugs.htm)

3. Road safety performance indicators (SPIs) according to main risk factors/2

3.2. safety belt and child restraints

International or regional comparisons of protective systems' usage rates are important tools for recognising deficiencies, setting priorities and stimulating efforts at political level.

3. Road safety performance indicators (SPIs) according to main risk factors/3

The suggested SPIs in the SafetyNet project:

1. Daytime wearing rates of safety belts
   - in front seats
   - in rear seats
   - child restraint use in passenger cars
   - (for different vehicle categories)
2. Daytime wearing rates of crash helmets
   - cyclists
   - moped riders
   - motorcyclists

(See details on: http://erso.swov.nl/data/content/spis_on_protective_systems.htm)

3. Road safety performance indicators (SPIs) according to main risk factors/4

3.3. Speed

The SPIs developed here, are:

- mean speed,
- standard deviation,
- 85% speed
- % of drivers exceeding the speed limit

(for different road types, vehicle types, periods of day and periods of week, i.e. weekdays and weekends.)

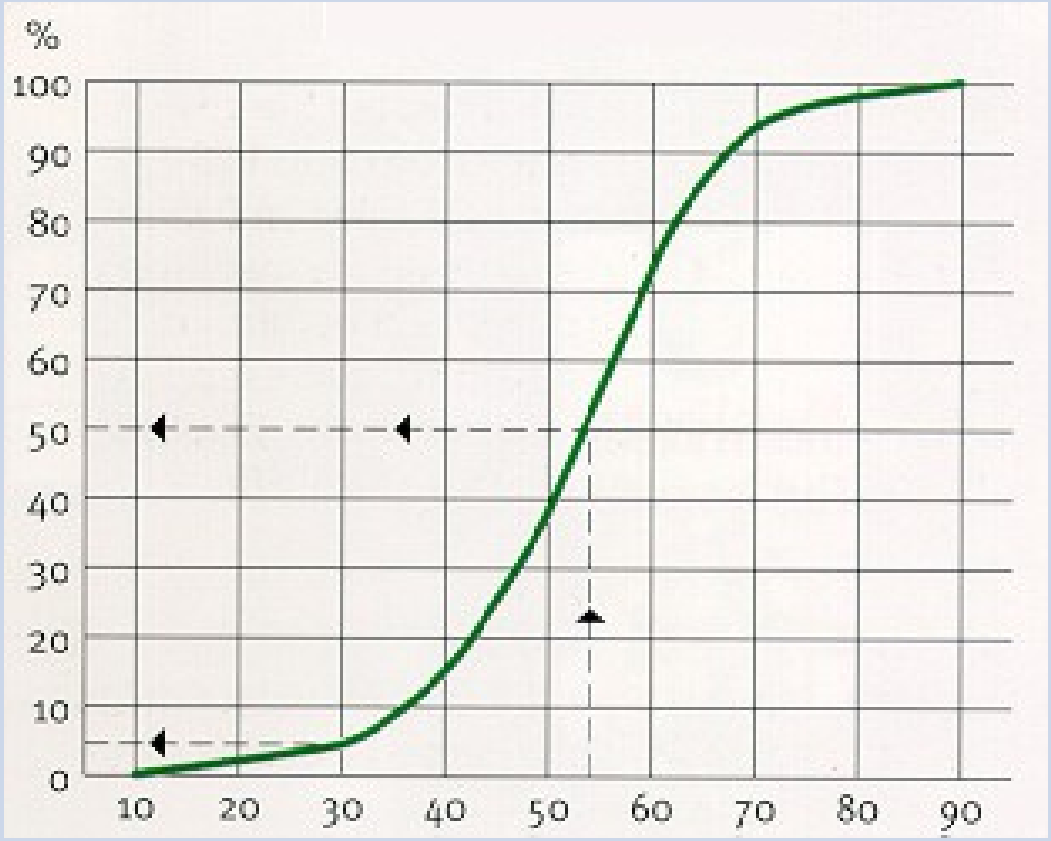
(See details on: http://erso.swov.nl/data/content/spis_on_speed.htm)

Speed is of basic importance from the point of view of vulnerable road users as well (also important area in SOL)

3. Road safety performance indicators (SPIs) according to main risk factors/5

v<30 km/h,
5%

v> 50 km/h,
50%



probability of pedestrian fatality in relationship with collision speed

3. Road safety performance indicators (SPIs) according to main risk factors/6

Some examples from Győr:

The pedestrian crossing close to an elementary school

Source: research report of the SBS Kft.

3. Road safety performance indicators (SPIs) according to main risk factors/7

Some examples from Győr:

Results of measurements:

In the cross section of the pedestrian crossing.

Time of the measurement: 24.03.2011 9:35:00 - 24.03.2011 10:35:00

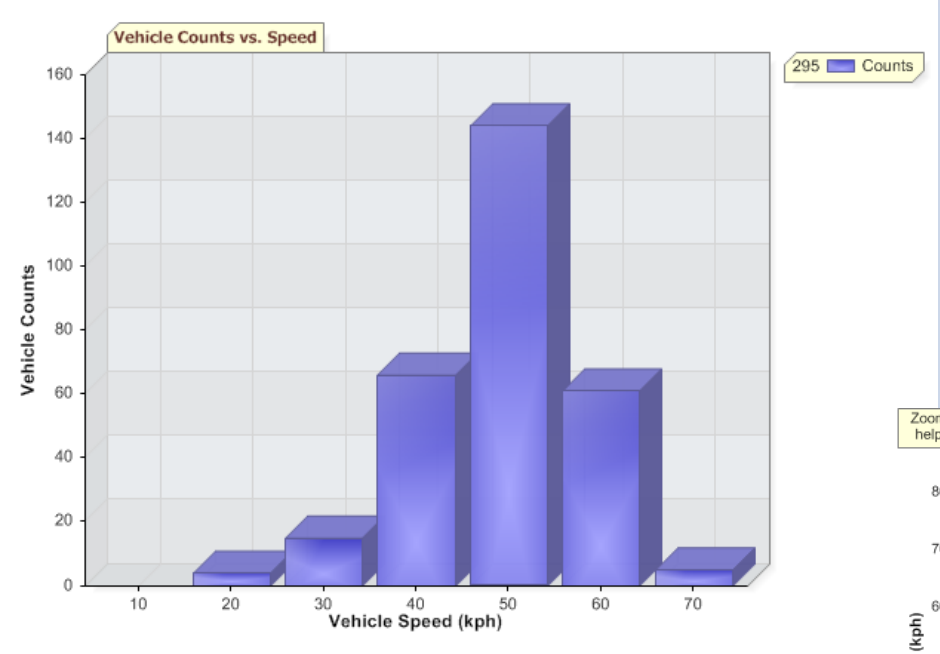
V85 = 53,4 km/h

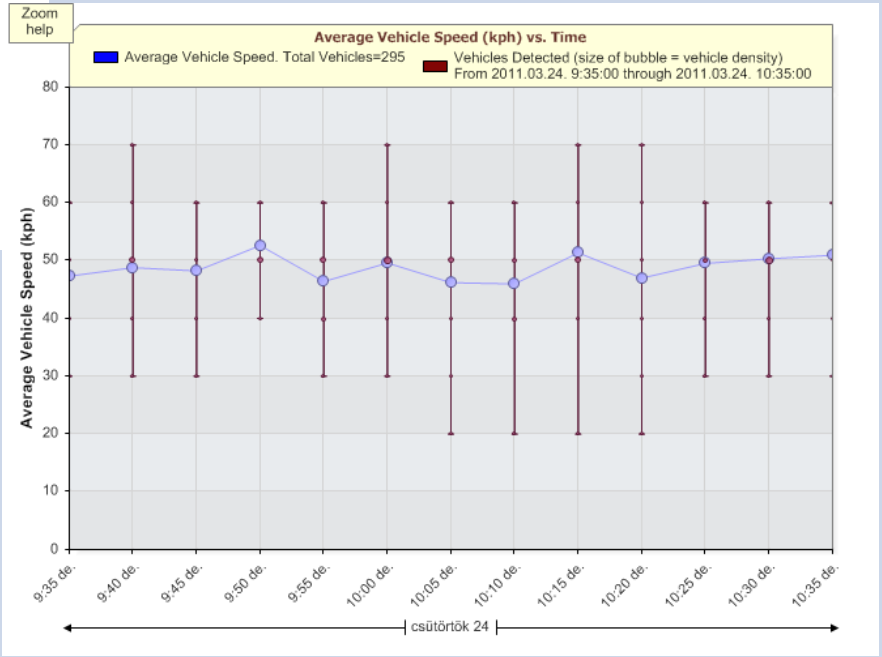
Number of vehicles belonging to V85 : 251 pcs

Vmax = 70,0 km/h 24.03.2011 9:40:00

Total number of vehicles = 295 pcs

3. Road safety performance indicators (SPIs) according to main risk factors/8





3. Road safety performance indicators (SPIs) according to main risk factors/9

Speed measurement results are available at the police too, but we need measurements in the free traffic flow first of all.

Not only the speed level is important from the point of view of safety, but the speed distribution too. (Homogeneity)

In traffic engineering the 85% speed is used. (The speed under which 85 percent of traffic is travelling).

The aim is not only to decrease the speed level, but the great speed differences too, in other words to reach a more homogeneous speed distribution.

3. Road safety performance indicators (SPIs) according to main risk factors/10

3.4. child injury prevention from road accidents

In the “Hungarian National Action Plan on Child and Youth Safety” the following indicators are used to monitor the improvement of the road traffic safety of children (0-14 years of age):

1. The rate of serious and fatal injuries resulting from road traffic accidents in the 0-14 age group, by age group and role
2. The percentage of children travelling in child safety seat, by age group
3. The percentage of children using safety belts, by age group

3. Road safety performance indicators (SPIs) according to main risk factors/11

4. The percentage of children wearing protective helmets, by age group
5. The percentage of children wearing reflective vests when cycling, by age group

4. Conclusions

The main aim of SOL is the capacity development, the improvement of the human factor (education, campaigns, etc.)

Therefore the behaviour oriented performance indicators are of basic importance, such as:

- safety belt wearing rates
- percentage of drivers who are exceeding the speed limit
- percentage of drivers who take part in traffic under the influence of alcohol

4. Conclusions /2

Important further indicators could be:

- number of drivers punished for speeding
- number of drivers punished for drinking and driving
- number of drivers punished for non-wearing of the safety belts or non using the child restraints, etc.

(National data are available in ETSC publications)

5. Remarks on the basic data set

- The suggested indicators for evaluation of the local RS programmes have already been elaborated.
- Their details were reported in my two last presentations (WP5 update – Evaluation, monitoring, Warsaw, 1-3 March 2011, Road Safety assessment: risk factors and indicators, Munich, 12 May 2011)
- It is obvious that we have to use the same indicators at the end of the project as before the programme implementation.

  (Before – after comparison)

5. Remarks on the basic data set /2

- The present set of indicators for the road safety assessment have been elaborated in close cooperation with ITS.
- The present set of indicators is a compromise between the perfect solution (theory) and the given possibilities (practice, deadline)
- Unfortunately some data are lacking or are not available in the necessary form.

6. Remarks to the questionnaire

1) It is not clear what does “collisions” mean?
   Fact: everyone creates new definitions.
   Suggestion: we should use the definitions of international databases or international literature.
   For example, in connection with collisions one can speak about single-vehicle or multi-vehicle accidents.
2) The “collisions” could be entirely different.
   Suggestion: accident types have to be used.
   For example: head-on collisions, rear-end collisions, etc.
3) The pedestrian accidents are also collisions between motor vehicle and pedestrian.

6. Remarks to the questionnaire /2

As risk indicator the mortality rate (killed/100 000 inhabitants) has been selected.

Fact: this indicator alone cannot be used for international comparison without distortion.

Not the number of inhabitants but the level of motorisation (motor vehicles /1000 inhabitants) is decisive from the point of view of road safety. This indicator does not take into consideration the level of motorisation.

(Unfortunately ETSC uses only this indicator for international comparisons)

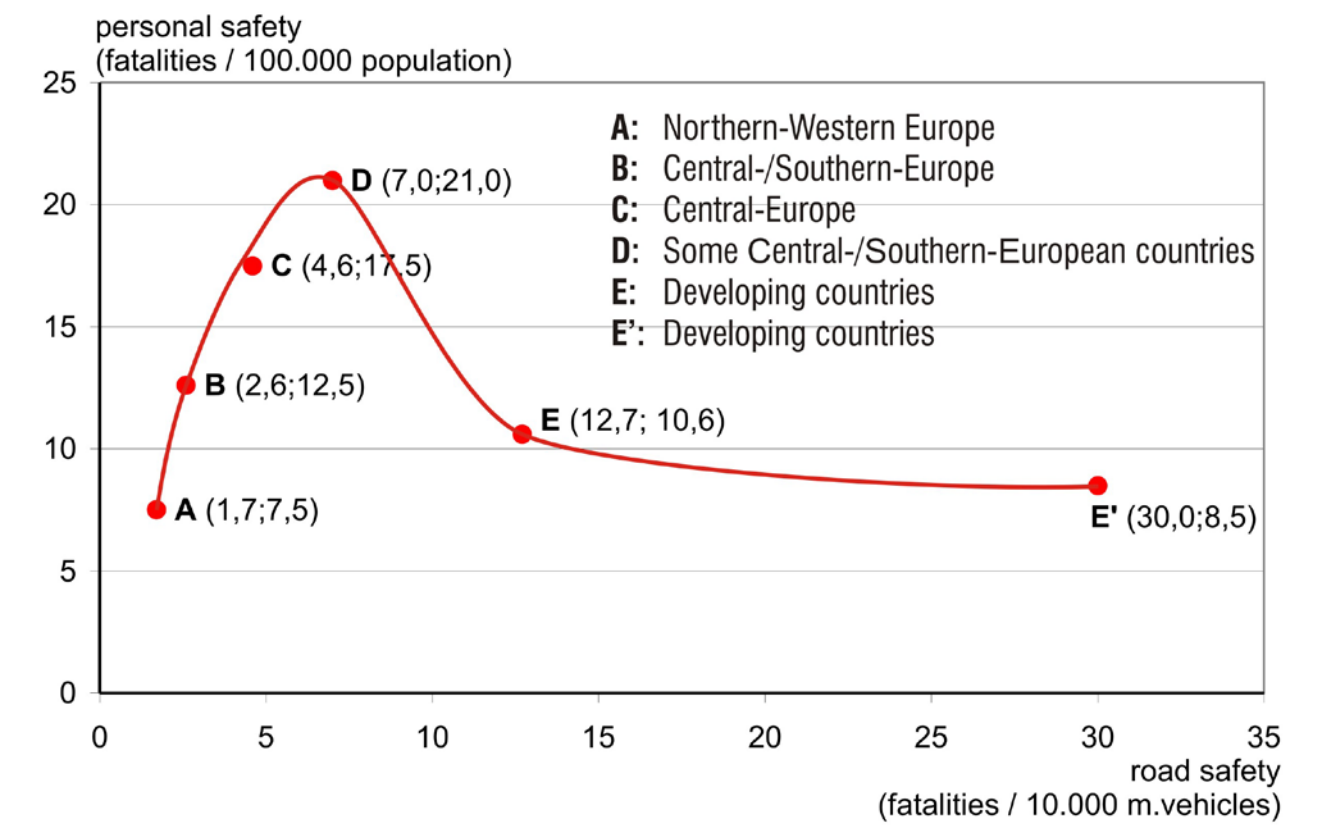
The mortality rate can be used for the "measurement" of the development. In form of time series it is a reasonable indicator.

6. Remarks to the questionnaire /3

Suggestion: the mortality rate has to be used together with the fatality rate (killed/10 000 motor vehicles)

This “two-dimension-model” (elaborated by Haight et al.) is very simple and takes into account the level of motorisation,too.

6. Remarks to the questionnaire /4



The two-dimension-model for international comparison of road safety (Haight et. al.)

6. Remarks to the questionnaire /5

As fatality risk, killed/106 vehicle-km has been selected.

Fact: From theoretical point of view it is the best indicator. Vehicle-kilometres are the "best" exposure data. In other parts of the questionnaire number of inhabitants and number of motor vehicles are used as exposure data. The problem is that in a region or in a town these data cannot express the real exposure. This is true especially in case of high percentage of transit traffic (e.g. Győr)

6. Remarks to the questionnaire /6

It is easy to understand that not only local residents and not only locally registered motor vehicles are travelling in a region or in a town.

Therefore it would be necessary to collect (to measure or to estimate) reliable vehicle-kilometres for the local network.

It is a complicated and expensive task but its implementation necessarily arises in the future.

7. Conclusions

- The present set of road safety indicators represents a compromise between the possibilities and real circumstances.
- This set of indicators can be used for the evaluation of local RS programmes.
- During the implementation of the programme and first of all, in the future the “package” of indicators should be further elaborated.
- This set is only the basic one, additional indicators can also be used for the evaluation.

8. Some details of the road safety assessment

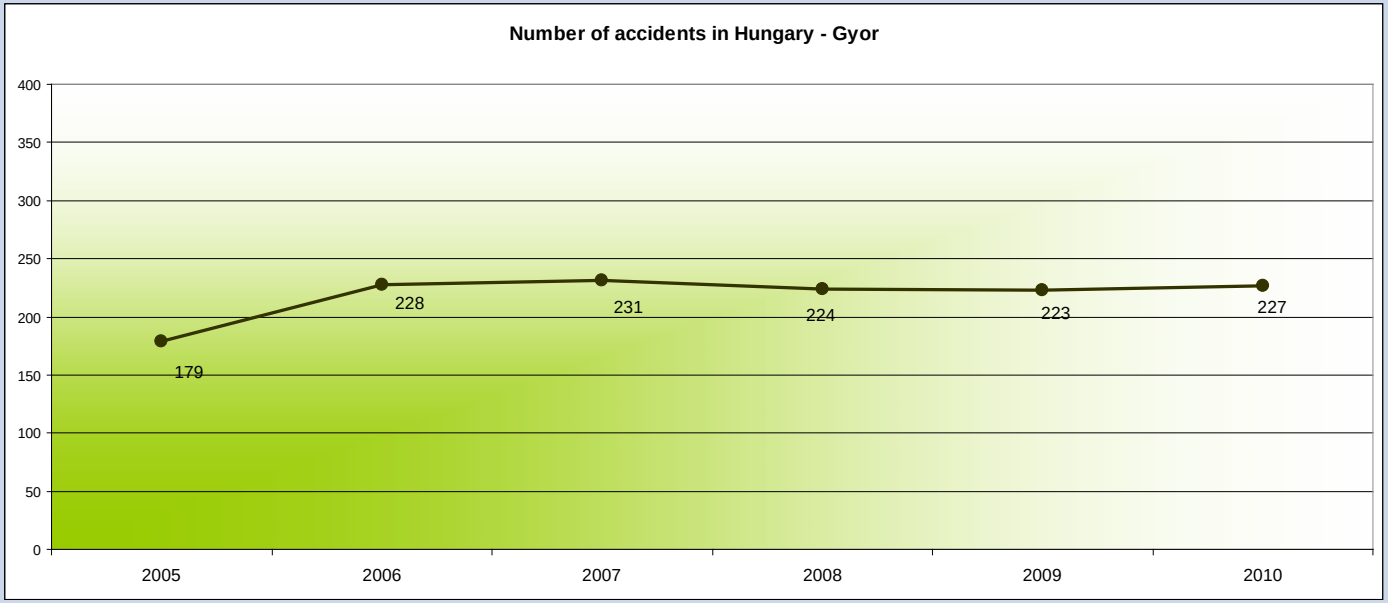
– The number of people killed is very low from statistical point of view. (However, in the reality it can never be low enough. See our long term vision!) Therefore it is impossible to draw any meaningful conclusion for the measures necessary and the effect of random fluctuation is very high.

– The number of personal injury road traffic accidents and those of people injured are high enough to identify trends and to make further – more detailed – analysis.

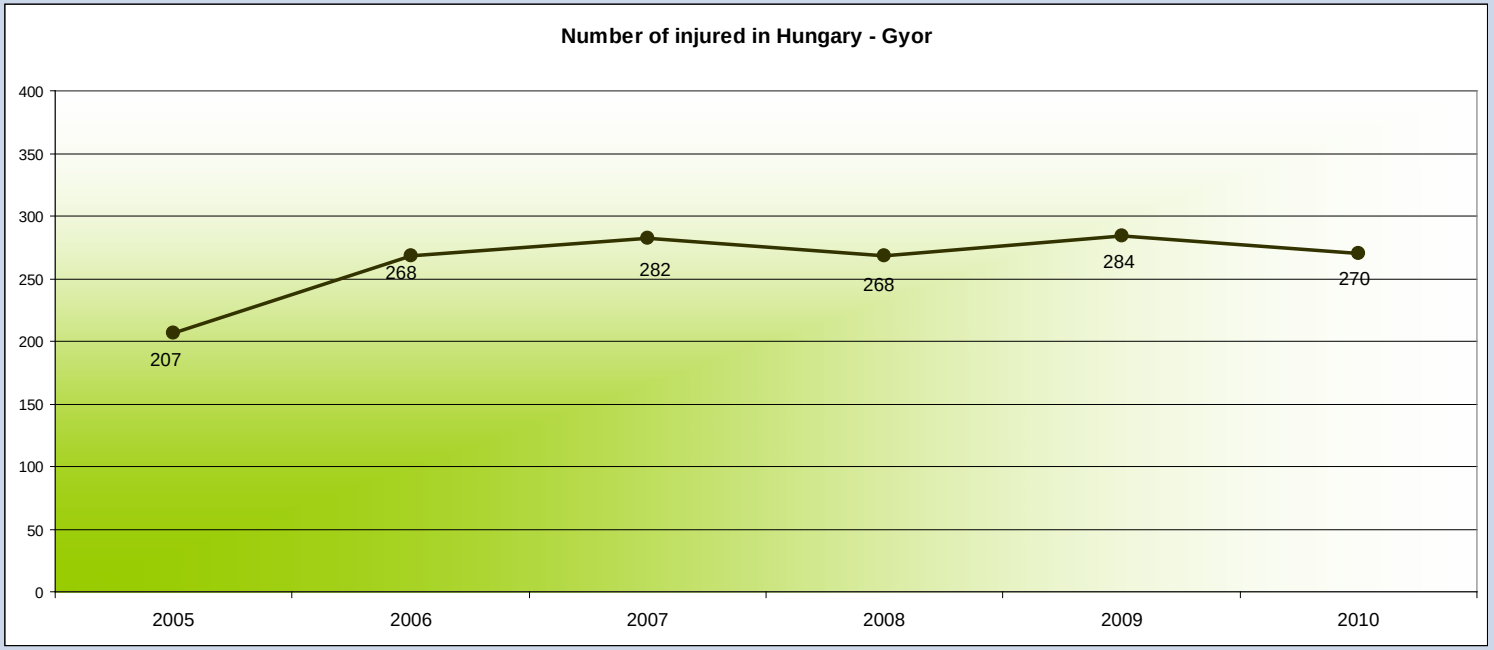
Year	Number of personal injury accidents	Number of killed	Number of injured
2005	179	1	207
2006	228	7	268
2007	231	6	282
2008	224	4	268
2009	223	8	284
2010	227	4	270

8. Some details of the road safety assessment /2

– The number of personal injury road traffic accidents and those of people injured are practically stable in recent years. For example the number of accidents was 228 in 2006 and 227 in 2010. An other example: the number of people injured (seriously and slightly) was 268 in 2006 and 270 in 2010.



8. Some details of the road safety assessment /3



8. Some details of the road safety assessment /4

– This stability means that the main aim of the local road safety strategy could only be to significantly decrease the number of personal injury road traffic accidents and those of people injured.

– To identify the main target areas, we have to analyse the numbers of accidents and people injured according to the most important circumstances (mode of traffic, age group, cause of accident, time of the day, location of accident, etc.)

8. Some details of the road safety assessment /5

Some conclusions which can be useful in the elaboration of the local road safety strategy:

1) The number of persons seriously injured in accidents involving drivers impaired by alcohol shows an increasing trend. It was 9 in 2005 and 14 in 2010. It seems that driving under the influence of alcohol is really an increasing problem in Győr.

Year	Injured in accidents involving driveres impaired by alcohol		
	S*	SL**	Σ
2005	9	19	28
2006	6	20	26
2007	10	38	48
2008	11	16	27
2009	11	29	40
2010	14	19	33
Σ	61	141	202

*S – Seriously injured
**SL – Slightly injured

8. Some details of the road safety assessment /6

2) Between 2005 and 2010 the most seriously injured people were car occupants (127) and pedestrians (112). The number of seriously injured cyclists was also high (101) in this period. All this means that the more effective protection of

-car occupants

-pedestrians, and

-cyclists

is necessary

for the future.

Injured by road users group

Year	injured pedestrians			injured in passangers cars			injured motorcyclists			injured bicyclists		
	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ
2005	23	19	42	17	67	84	11	5	16	10	26	36
2006	28	30	58	20	78	98	8	7	15	21	29	50
2007	21	33	54	25	102	127	4	9	13	21	29	50
2008	13	27	40	20	101	121	12	9	21	13	31	44
2009	11	19	30	26	110	136	3	12	15	14	35	49
2010	16	22	38	19	88	107	4	9	13	22	42	64
Σ	112	150	262	127	546	673	42	51	93	101	192	293

*S – Seriously injured

**SL – Slightly injured

8. Some details of the road safety assessment /7

3) Since Győr is a town, it is obvious that most of the seriously injured people (421 out of 465) suffered their injuries inside built-up areas.

Injured by road type

Year	Injured in built-up area			Injured outside built-up area		
	S*	SL**	Σ	S*	SL**	Σ
2005	71	125	196	3	8	11
2006	87	168	255	4	9	13
2007	83	173	256	7	19	26
2008	61	179	240	9	19	28
2009	61	181	242	10	32	42
2010	58	180	238	11	21	32
Σ	421	1006	1427	44	108	152

*S – Seriously injured
**SL – Slightly injured

8. Some details of the road safety assessment /8

4) Unfortunately we do not have exposure data – number of vehicle kilometres - for daytime and nighttime periods. Therefore the simple distribution of people injured according to the time of the day does not provide us any useful information. Taking into account that the traffic volume is probably very low in nighttime (to be more precise: in darkness), the number of seriously injured people in nighttime seems to be quite high.

Injured by time of day

Year	Injured during day			Injured during night		
	S*	SL**	Σ	S*	SL**	Σ
2005	58	101	159	16	32	48
2006	71	119	190	20	58	78
2007	63	123	186	27	69	96
2008	49	148	197	21	50	71
2009	53	154	207	18	59	77
2010	49	154	203	20	47	67
Σ	343	799	1142	122	315	437

*S – Seriously injured
**SL – Slightly injured

8. Some details of the road safety assessment /9

5) These age group intervals are used in the statistics but some of them are too big compared to others. For example the age group 25-64 is too big compared to the 15-17, or the 10-14. It means that the statistical weight of this age group will be much higher than those of others which can be misleading.

6) In spite of remark 5, it can be clearly seen that the age group 65- is the target group among pedestrians. In other words, most of the seriously injured pedestrians (44 people) are older than 65 years.

Injured by age - pedestrians

Year	0-5			6-9			10-14			15-17			18-24			25-64			65-			Σ		
	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ
2005					1	1	2	2	4		5	5	2	1	3	7	8	15	12	2	14	23	19	42
2006	1	3	4	1	1	2	3	4	7	1	5	6	4	5	9	7	8	15	11	4	15	28	30	58
2007		2	2	1	4	5	4	2	6		2	2	1	2	3	9	12	21	6	9	15	21	33	54
2008		1	1	1		1	1	3	4	1	4	5	1	2	3	4	15	19	5	2	7	13	27	40
2009				1	1	2	1	2	3	1		1	1	2	3	2	7	9	5	7	12	11	19	30
2010					3	3				1	2	3		3	3	10	10	20	5	4	9	16	22	38
Σ	1	6	7	4	10	14	11	13	24	4	18	22	9	15	24	39	60	99	44	28	72	112	150	262

*S – Seriously injured
**SL – Slightly injured

8. Some details of the road safety assessment /10

7) In groups of other road users (car occupants, motorcyclists, cyclists) the most seriously injured people belong to the age group 25-64, which is no surprise at all. On the one hand this is the so–called “active” age group. On the other hand this is the biggest age interval. During our further analysis we have to apply other, more detailed age groups too.

Injured by age - in passanger cars

Year	0-5			6-9			10-14			15-17			18-24			25-64			65-			Σ		
	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ	S*	SL**	Σ
2005								3	3	1	1	2	4	16	20	10	40	50	2	7	9	17	67	84
2006		2	2					2	2	1	3	4	1	22	23	17	49	66	1		1	20	78	98
2007		4	4		4	4		7	7	2	3	5	3	22	25	19	60	79	1	2	3	25	102	127
2008		3	3		4	4		2	2	1	4	5	1	18	19	14	59	73	4	11	15	20	101	121
2009		3	3		4	4		2	2	2	4	6	4	25	29	17	64	81	3	8	11	26	110	136
2010		4	4		2	2		5	5	1	2	3	4	15	19	11	56	67	3	4	7	19	88	107
Σ	0	16	16	0	14	14	0	21	21	8	17	25	17	118	135	88	328	416	14	32	46	127	546	673

*S – Seriously injured

**SL – Slightly injured

9. How to go further?

These analyses are only the first steps.

The further – more detailed – analysis, the identification of the main aims of the local road safety programme can only be carried out in close co-operation with the local experts, stakeholders.

To begin of this activity was the main aim of the workshop in Győr organised on 16th September.

Thank you
for your attention !

Prof. Dr. Péter HOLLÓ –
hollo.peter@kti.hu